Math 115
Worksheet Section 2.6

Warm-up questions

What does it mean for a function to be differentiable?
Give an example of function that is not differentiable at a point.

Problem 1. The graph of $y = x^3 - 9x^2 - 16x + 1$ has tangent lines with a slope of 5 at two points. Find the coordinates of these points.

Problem 2. The height of a sand dune (in cm) is represented by $f(t) = 700 - 3t^2$, where t is measured in years since 2005.

(a) Find $f(5)$.

(b) Find $f'(5)$.

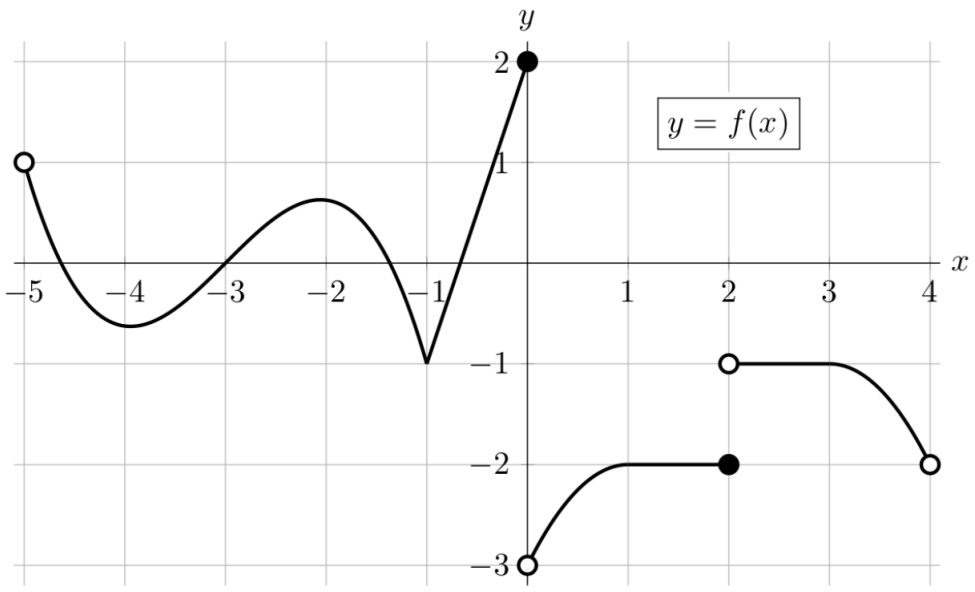
(c) Provide practical interpretations of these two quantities.

Problem 3. Using a graph to help you, find the equations of all lines through the origin tangent to the parabola

$$y = x^2 - 2x + 4.$$

Sketch the lines on your graph.

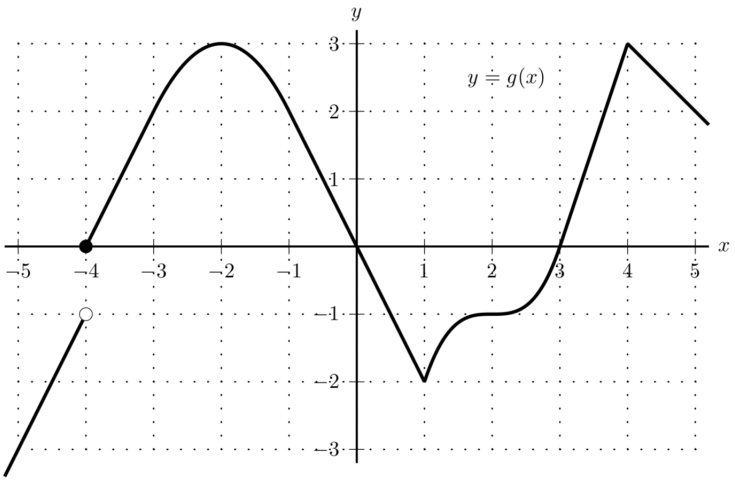
Problem 4. (Fall 2016 Exam 2) The graph of a function f is shown below.



Sketch a graph of $f'(x)$ (the derivative of the function $f(x)$) on the interval $-5 < x < 4$. Be sure that you pay close attention to each of the following:

- Where f' is defined.
- The value of $f'(x)$ near each of $x = -5, -4, -3, -2, -1, 0, 1, 2, 3, 4$.
- The sign of f'.
- Where f' is increasing/decreasing/constant.

Problem 5. (Winter 2014 Exam 2) The graph of a function g is shown below.



Sketch the graph of y = $g'(x)$. Be sure that you pay close attention to each of the following:

- Where g' is defined.
- the value of $g'(x)$ near each of $x = -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5$
- The sign of g'.
- Where g' is increasing/decreasing/constant.